COMPARATIVE ANALYSIS OF U.S. FEDERAL FISHERY MANAGEMENT TO THE FAO ECOLABELLING GUIDELINES

COMPLETED FOR THE CENTER FOR INDEPENDENT EXPERTS (CIE)

Susan Hanna, Professor Emeritus of Marine Economics
Oregon State University
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EXECUTIVE SUMMARY

This review is motivated by questions of sustainable management within government processes: Specifically, does the U.S. system of management conform to international standards set out for eco-certification? If so, are third-party certifications needed?

The review summarizes evidence of conformance of the U.S. federal fishery management system to Food and Agriculture Organization (FAO) eco-labeling guidelines using a framework developed within the Office of Sustainable Fisheries, National Marine Fisheries Service. I assess performance on three levels: Internal to the management system, outcomes of the management system, and independent verification. I conduct the assessment by examining evidence in the form of existing laws, guidelines, policies, practice, and performance reviews. The tri-level assessment is completed over 24 indicators called "Topics of Pertinence."

I find evidence that the U.S. federal fishery management system is in conformance to FAO eco-labeling guidelines over a number of indicators.

- The Magnuson-Stevens Act (MSA) contains many references to the goal of long-term sustainability of stocks and the conditions required to achieve it. Several operational requirements of fishery management are designed to promote achievement of that goal.
- U.S. federal fishery management is implemented through a complex set of procedural rules, regional decision bodies, federal agencies, national legislation, and international agreements, supported by a large body of scientific and administrative information, particularly in the area of stock assessment and harvest controls. The transparency and detailed documentation of management procedures and outcomes, as well as open public access to information, allow independent review of management approaches and legal compliance.
- The structure and procedures of regional fishery management councils allow multiple avenues for different types and scales of fisheries to be represented in management. Traditional and community knowledge are acknowledged as important and required to be considered.
- The use of the best available scientific information in decision-making is the foundational principle of U.S. federal fishery management. Best available scientific information is the basis of all research and analysis supporting decision-making.
- Uncertainty is explicitly accounted for in the preparation of biological analyses for management decision-making. The accounting is required by national standards and the guidelines that prescribe how those standards are implemented.
- Maximum sustainable yield is the unifying standard across all U.S. federal fishery management. All managed fisheries are required to have MSY or an MSY proxy specified and to be assessed against this benchmark. MSY estimates are key components of stock assessments and are reviewed by council SSCs and through external independent review processes.

- The specification of performance indicators is required of all FMPs. These are monitored on an annual basis for all fisheries and receive occasional external review. All managed fisheries are required to have annual catch limits and accountability measures. Overfished stocks are required to be rebuilt in specified time frames.
- Monitoring and enforcement are embedded in the legal requirements for fishery management, as well as in the routine of council operations.
- Habitat and ecosystem considerations are an element of many areas of regional fishery management council operations. The consideration of essential fish habitat, habitat areas of particular concern, and habitat and ecosystem effects of fishing is a standard component of federal fishery management.

The evaluation identifies some areas of weakness in the performance of U.S. fishery management.

- Data adequacy: while biological data are adequate for stocks of greatest commercial value, ecological, economic and social data are often incomplete.
- Total fishing mortality: The extent and methods by which bycatch and discard mortality are incorporated in to analyses varies across regions, primarily due to variation in data availability.
- Optimal utilization: Even in cases where optimal utilization is listed as a management objective for a fishery, the definition of "optimal" tends to be one suiting the context of the fishery at the time the FMP is first developed, but not revisited or analyzed in comparison to alternative uses after the implementation of the plan.
- Food-web and larger ecosystem considerations: The extent to which these are addressed in fishery management appears to vary by region.
- Long-term changes in productivity: Consideration is not presently a requirement of FMPs but is incorporated into some.
- Assessment of data-inadequate stocks: The question of indicator stock selection and level of risk associated with using their information in modeling or decision-making is an active one, subject to regular review and discussion in the review of stock assessments that contain indicator stocks.
- Bycatch and discards: these are subject to active attention within the fishery management system. A number of different approaches have been developed to minimize bycatch and address the problem of discards, varying by fishery and by region.

After evaluating the fishery management system over each of the 24 Topics of Pertinence, I present some conclusions and recommendations for consideration.

Conclusions

- The assessment framework represents an ambitious undertaking to provide a mechanism for evaluation and communication of performance in relation to the FAO guidelines.

- The framework offers the potential for identifying critical information gaps.
- Some framework language is cumbersome.
- A weakness of the framework document is that, like the FAO guidelines, it limits its focus to the biological dimensions of sustainability. Human behavior and the incentives that motivate it are foundational to achieving sustainability.
- Within the biological scope of the framework, performance varies across the eight council regions, limiting the ability to generalize system-wide.
- Some Topics of Pertinence are redundant.

Recommendations

- Revise the framework to apply to the explicitly regional structure of the U.S. management system.
- Limit the framework's statement of intent to the evaluation and communication objectives.
- Make the framework less representative of FAO language and more reflective of the U.S. context by phrasing indicators in language that is operationally familiar to the U.S. system.
- Define and simplify terms to better communicate and to provide consistency across evaluations.
- Consider broadening the scope of the framework to represent the human dimensions of sustainability. This would entail developing indicators that assess economic and social elements. Alternatively, make it clearer in the methodology document that the assessment is intended to assess only biological dimensions.
- Clarify whether the framework is intended to apply only to federally managed fisheries or also to state fisheries. Fisheries in state waters are managed in coordination with the federal management, but with variations in applicable legislation, policies and regulations.
- Consider combining and reducing the number of indicators. Some Topics of Pertinence cover similar subject areas but appear at different points in the document.
- Decide which parties will conduct the evaluations: Will they be internal or external to the fishery management system?

BACKGROUND

The review is motivated by an interest in establishing the extent to which U.S. fisheries managed under federal jurisdiction are in conformance with international eco-labelling standards as represented by the United Nations Food and Agriculture Organization Guidelines for the Eco-labeling of fish and Fishery Products from Marine Capture Fisheries (FAO 2009). Reviewers are asked to assess the conformity of the U.S. federal management system to the FAO guidelines, using a framework developed within the National Marine Fisheries Service Office of Sustainable Fisheries.

REVIEWER ROLE

I performed a desk review of two documents provided by the NMFS Office of Sustainable Fisheries. These documents are cited in the literature section as Walsh and Lassen (2014) and Walsh et al. (2014). Using the framework provided in these documents, I assess conformance of the U.S. federal fishery management system to the FAO eco-labeling guidelines over 24 Topics of Pertinence. I provide literature citations for evidence of performance in internal, outcome, and independent categories specified by the Terms of Reference. I present the assessment of performance of the Topics of Pertinence, citation of evidence and discussion of strengths and weaknesses in the Findings Section. I provide general comments and future considerations in the Conclusions and Recommendations section.

FINDINGS

In this section I summarize evidence of conformance for each of 24 topics of pertinence. Each table presents the type and strength of evidence related to the topic with examples from specific fisheries added in some cases. Strengths and weaknesses of the U.S. management system in relation to the individual topic of pertinence are summarized in a discussion section following each table.

Topic of Pertinence #1: Management system is in compliance with relevant local, national and international laws			
Type of Evidence	**Internal**	**Outcome**	**Independent**
Symbol Rating	●	●	●
Description	**Magnuson-Stevens Fishery Conservation and Management Act (MSA)**, the principal law governing the harvest of fishery resources within the U.S. 200-mile zone. MSA Sec. 301: Fishery management plans (FMPs) must conform to 10 National Standards specified in the Act. Sec	Fishery management plans Environmental impact analyses Regulatory flexibility analyses Interagency consultation International treaty organization	Challenges to compliance may be made: at Council meetings; through public comment; through interagency consultations; through legal litigation. Example: In 2001 National Resources Defense Council (NRDC)

	303: "Any fishery management plan …shall be…consistent with the national standards, the other provisions of this Act, regulations implementing recommendations by international organizations in which the United States participates. And any other applicable law." Sec. 305: "Regulations promulgated by the Secretary under this Act…shall be subject to judicial review" (MSA 2007). **"Other applicable U.S. laws"** governing the fishery management system: National Environmental Policy Act (NEPA; DOE 1969), the Marine Mammal Protection Act (MMPA; DOC 1972a), the Migratory Bird Treaty Act (MBTA; DOI 1918); the ; FR 1980Administrative Procedure Act (APA; 1946), Paperwork Reduction Act (PRA; FR 1980): Regulatory Flexibility Act (RFA): Coastal Zone Management Act (CZMA; DOC 1972b); Fish and Wildlife Coordination Act (FWCA; DOI 1934): and other relevant U.S. laws, Executive Orders (12866; 12898;13132; 13175; 13186) and regulations. **U.S. High Seas Fishing Compliance Act** : implements the U.N. Agreement to Promote Compliance with	participation	successfully challenged the procedural and timing aspects of PFMC rebuilding schedules for two groundfish species (NRDC vs. Evans 2003)

	International Conservation and Management Measures by Fishing Vessels on the High Seas (DOC 1995). **U.N. Convention of the Law of the Sea:** Agreement for the Implementation of the Provisions of the United Nations Convention on the Conservation and Management of Straddling Fish Stocks and Highly Migratory Fish Stocks (UN 2001), and the U.N. FAO Code of Conduct (FAO 1995). **International treaty organizations,** e.g. International Pacific Halibut Commission, Pacific Salmon Commission, International Pacific Whiting Commission, Western and Central Pacific Fisheries Commission, Inter-American Tropical Tuna Commission, Migratory Bird Treaty,		

Discussion Topic of Pertinence #1: U.S. fishery management is implemented through a complex set of regional decision bodies, detailed procedural rules, national legislation, and international agreements. The transparency and detailed documentation of management procedures and outcomes allow independent review of legal compliance and provide administrative and legal avenues to challenge noncompliance.

Topic of Pertinence #2: There are documented management approaches for the "stock under consideration"			
Type of Evidence	**Internal**	**Outcome**	**Independent**
Symbol Rating	●	●	●
Description	**MSA Sec. 301** requires Fishery Management Plans that document management approaches for all managed stocks (MSA 2007)	FMPs Council operating procedures NS Guidelines Fishery Rebuilding Plans Stock assessments and	Management procedures are prescribed in detail and documented through Council reports and FAQ sheets, NMFS tech memos and analyses, website information. All

	MSA Sec. 301: "Any FMP prepared shall be consistent with the following national standards…(N.S.)" 1: prevent overfishing; 2 based on best available scientific information; 3. Individual stocks managed throughout their range; 6. Take into account variations and contingencies in fisheries, fishery resources and catches; 9. Minimize bycatch and mortality of bycatch. **MSA Sec. 303**: specifies required content of FMPs (MSA 2007). **ESA Sec. 4**: recovery plans must be developed for threatened and endangered species (DOI 1973). **National Standard Guidelines**: NS 1 implementation must consider uncertainty in scientific information and management control; NS 2 implementation includes requirements of a Stock Assessment and Fishery evaluation (SAFE) report assessing biological success of management; NS 6 implementation must build risk and uncertainties into reference points and control rules for managed stocks; NS 9 implementation requires a precautionary approach in conditions of uncertainty (NMFS 2009).	other scientific analyses Bycatch regulations Recovery Plans	are available for public access and independent review.

Discussion of Topic of Pertinence #2: The U.S. management system is supported by a large body of scientific and administrative information, particularly in the area of stock assessment and harvest controls. The transparency and detailed documentation of management procedures and outcomes allow independent review of management approaches, as does the open public access to regional fishery management council meetings.

Topic of Pertinence #3: Uncertainty is taken into account via risk assessment or a precautionary approach			
Type of Evidence	**Internal**	**Outcome**	**Independent**
Symbol Rating	●	●	●
Description	**MSA Sec. 301**: "Any FMP prepared shall be consistent with the following national standards…(N.S.)" 6. Take into account variations and contingencies in fisheries, fishery resources and catches (MSA 2007). **National Standard Guidelines**: **NS 1** implementation must consider uncertainty in scientific information and management control; **NS 2** implementation includes requirements of a Stock Assessment and Fishery evaluation (SAFE) report assessing biological success of management; **NS 6** implementation must build risk and uncertainties into reference points and control rules for managed stocks; **NS 9** implementation requires a precautionary approach in conditions of uncertainty (NMFS 2009). NMFS management guidelines require a series of precautionary	Setting ABCs to account for the uncertainty in overfishing level (OFL) estimates Annual catch limits (ACLs) set below the ABCs to account for management uncertainty Annual catch targets (ACTs) set below ACLs to account for management uncertainty NMFS technical guidance on the use of precautionary approach in the implementation of NS 1 (Restrepo et al. 1998) Example: Under Amendment 23 of the West Coast Groundfish FMP, The PFMC uses a harvest control rule precautionary buffers are used between OFL and ABC to address the scientific uncertainties and between ABC and ACL to address the management uncertainties and other issues. The FMP uses a framework mandating precautionary reductions from the ABCs for stocks whose biomasses are below the B_{MSY} proxy (PFMC	SSC review of stock assessments and other analyses that provide the information base of decision making. CIE coordinated reviews of management analyses and processes Examples: Oregon trawl Commission sponsorship of a management strategy evaluation (MSE) of harvest control rules for flatfish to ensure major uncertainties are accounted for, as part of Marine Stewardship Council certification (Intertek Moody Marine 2014). MSE of rebuilding rules for North Pacific rockfish (Punt et al. 2009). Evaluation of threshold management strategies for West Coast groundfish (Punt et al. 2008).

	measures in setting the allowable catch (DOC 2009)	2014).	

Discussion of Topic of Pertinence #3: Uncertainty is explicitly accounted for in the preparation of biological analyses for management decision-making. The accounting is required by national standards and the guidelines that prescribe how those standards are implemented. Uncertainty is accounted for in stock assessments that are tiered by risk category according to the quantity and quality of information available. It is explicitly addressed in setting precautionary harvest controls.

Topic of Pertinence #4: Ecosystem Effects of fishing are assessed and adverse effects addressed			
Type of Evidence	**Internal**	**Outcome**	**Independent**
Symbol Rating	●	●	●
Description	**MSA Sec. 3 (5)**: Conservation and management designed to ensure that irreversible or long-term adverse side effects on fishery resources and the marine environment area avoided. **Sec 3(33)**: optimum yield takes into account the protection of marine ecosystems. **Sec. 302**: FMPs should take into account the interaction of the overfished stock of fish within the marine ecosystem. **Secs. 303 and 305:** FMPs must describe and identify essential fish habitat, including identifying and minimization of adverse impacts of fishing on such habitat (MSA 2007). **National standards:** implementation of **NS 1** requires consideration of ecological factors in specification of optimal yield (OY) (NMFS 2009) **MMPA Sec. 101**	Each FMP contains the following EFH components: EFH Descriptions and Identification Fishing activities that may adversely affect EFH Non-Magnuson-Stevens Act fishing activities that may adversely affect EFH Non-Fishing activities that may adversely affect EFH Cumulative impacts analysis EFH Conservation and Enhancement Recommendations Prey species list and any locations HAPC identification Research and Information needs Review EFH every 5 years (MSA Sec. 305 (b) Joint USFWS and NMFS implementation of ESA regulations to protect habitat for threatened and endangered species (USFWS and NMFS 1998)	MSA section 305 (b) requires Councils to account for EFH and to conduct "a review and revision of EFH Components" every 5 years. the EFH Final Rule requires that the review should also evaluate: published scientific literature unpublished scientific reports information solicited from interested parties previously unavailable or inaccessible data. (67 FR 2343 2002.) Example: Independent reviews of EFH in Alaska in support of the Draft Environmental Impact Statement (DEIS) for EFH Identification and Conservation in Alaska. As part of this review, NMFS held a public meeting between the CIE panel and the NMFS scientists who designed the analysis and the underlying model (CIE 2004).

	requires monitoring the impact of commercial fisheries on marine mammals (DOC 1972) **Executive Order 13186** requires Federal agencies to develop memoranda of agreement to conserve migratory birds and to evaluate the effects of their actions on migratory birds in NEPA documents (E.O. 13186 2001) **NEPA Sec. 102** requires that environmental impacts of actions be assessed (DOE 1969) **ESA Sec. 7** requires interagency coordination for habitat protection (DOI 1973)	Examples: Amendment 19 of Pacific Coast Groundfish Fishery Management Plan created Essential Fish Habitat Conservation Areas (EFHCAs) of the U.S. West Coast Exclusive Economic Zone that resulted in 130,000 sq. mi. of habitat off limits to bottom trawling. (PFMC 2014a) The PFMC Habitat Advisory Committee works with other teams and panels to resolve habitat problems and avoid future habitat conflicts, and it makes recommendations for actions that will help achieve habitat objectives (PFMC 2007). Pacific Fishery Management Council (PFMC) Fishery Ecosystem Plan (PFMC 2013) Amendment 20 (trawl rationalization program) to the PFMC Groundfish Management Plan includes 100% on-board observer coverage of vessels and 100% monitoring of vessel onshore deliveries resulting in ability to monitor fishery interactions with other ecosystem components. (PFMC 2014a).	

Discussion of Topic of Pertinence #4: Habitat and ecosystem considerations are an element of many areas of regional fishery management council operations. They are required by the MSA, National Standards for fishery management plans, NEPA, interagency consultations on threatened and endangered species, marine mammals, and

marine birds, and Executive Orders of the President. The consideration of essential fish habitat, habitat areas of particular concern, and habitat and ecosystem effects of fishing is becoming a standard component of federal fishery management.

Topic of Pertinence #5: Types and scales of fisheries are considered in management			
Type of Evidence	**Internal**	**Outcome**	**Independent**
Symbol Rating	●	●	●
Description	**MSA Sec 2** states as policy of the congress "to foster and maintain the diversity of fisheries in the United States" (MSA 2007) **MSA NS6** requires that management measures take account of variations among and contingencies in fisheries, fishery resources and catches. **MSA NS8** requires that management take into account the importance of fishery resources to fishing communities in order to provide for their sustained participation and minimize adverse community economic impacts, an implicit recognition of the importance of variation in fishery types and scales. **Regulatory Flexibility Act (RFA)** requires that regulations minimize significant economic impact on small entities (FR1980). **MSA Sec.303A**. requires that participation criteria for limited access privilege programs and regional fishery associations consider traditional fishing and processing,	Regional Management Council advisory panels (industry-based) with representation from fisheries of various types and scale. FMPs adhere to NS Guidelines 6,8. Regulatory Flexibility Analyses are standard components of regulatory development. NS 6 Guidelines specifies that continual data acquisition and analysis will help the development of management measures to compensate for variations …Flexibility in management and regulation will aid in responding to contingencies. NOAA procedures for government-to-government consultation with federally recognized Indian Tribes and Alaska Native corporations (NOAA 2013a) Examples: Amendment 20 to the West Coast Groundfish FMP establishes a trawl rationalization program based on individual fishing quotas (IFQs). One objective of that program is to minimize adverse effects from an	Fisheries of different types and scale are represented in council membership and in council advisory bodies. Stakeholder comment at council meetings and through the APA notice and comment process provides independent review of the adequacy of consideration of types and scales of fisheries in the development of regulatory programs.

	cultural and social frameworks, economic barriers to access, and community stability. **Executive Order 13175** requires that federal agencies ensure meaningful and timely input by tribal officials in the development of regulatory policies affecting tribes (E.O. 13175 2000). **Executive Order 12898** requires federal agencies to identify and address "disproportionately high adverse human health or environmental effects of their programs, policies, and activities on minority and low-income populations in the United States" as part of an environmental impact analysis associated with an action (E.O. 12898 1994).	IFQ program on fishing communities and other fisheries to the extent practical (PFMC 2014a). Community Development Quota programs in North Pacific and Western Pacific (MSA 2007). Pacific Fishery Management Council has a dedicated treaty-tribe seat (MSA 2007).	

Discussion of Topic of Pertinence #5: The structure and procedures of regional fishery management councils allow different avenues for different types and scales of fisheries to be represented in management. Perspectives of different types of fisheries are represented through council and committee membership and public comment of individuals and industry groups.

Topic of Pertinence #6: Adequate and reliable data are collected, maintained and assessed			
Type of Evidence	**Internal**	**Outcome**	**Independent**
Symbol Rating	●	◒	●
Description	**MSA NS 2** requires that conservation and management measures be based on the best scientific information available (MSA 2007). **MSA NS 6 Guidelines** specifies that continual data acquisition and	MSA NS 2 Guidelines describes scientific information required as basis for federal fishery management decisions to include biological, ecological, economic and social. Ecological information	NOAA Science Advisory Board review of social science data and research within NOAA. (Hanna et al. 2007) NRC review of marine fisheries data (NRC 2000)

	analysis will help the development of management measures to compensate for variations …Flexibility in management and regulation will aid in responding to contingencies (NMFS 2009). **MSA Sec. 303:** FMPs must "specify the pertinent data…with respect to commercial, recreational charter fishing and fish processing in the fishery." **MMPA Sec. 3** requires the collection and application of biological information to benefit marine mammal populations (DOC 1972). **ESA Sec. 4** specifies that species' status be determined based on the best available scientific and commercial data (DOI 1973).	to support ecosystem-based fishery management is growing but remains incomplete. There is an increasing need for socio-economic modeling and analysis (NOAA 2013d). Fishery-dependent and independent data are routinely collected as the basis of stock assessments. Availability and frequency of data collection varies across management regions (NOAA 2013c). MSA NS 2 Guidelines requires FMPs to identify scientific information needed from other sources, related to ecosystems, fisheries and fishing communities (NMFS 2009). Many fisheries operate under mandatory logbook reporting. Example: Participants in the PFMC and other limited access privilege programs are required to carry onboard observers for data collection and compliance monitoring.	Regional management councils Scientific and Statistical Committees (SSCs) comment on data adequacy for analysis. National Fisheries Observer Program (NOAA n.d.) MSA requires regional management councils to produce an annual research and data needs plan identifying gaps. Example: An assessment of West Coast Groundfish for the Marine Stewardship Council determined that groundfish stocks comprising the largest components of the catch had sufficient information to serve as the basis for assessment, but that quantitative information was less likely to be available for stocks comprising small proportions of the catch and/or managed as part of a species complex (Intertek Moody Marine 2014)

Discussion of Topic of Pertinence #6: The fishery management system has historically focused on biological data to provide the information base. As fisheries have become more intensively utilized and as the direction of management has broadened toward ecosystems, the need for social science and ecological data has increased. Although these areas have increased, they still represent a small component of the NOAA research portfolio. Data adequacy has been the subject of several independent reviews, but the outcome performance of data adequacy is still lacking overall and variable across council regions.

Topic of Pertinence #7: Traditional, fisher or community knowledge is considered			
Type of Evidence	**Internal**	**Outcome**	**Independent**
Symbol Rating	●	●	○
Description	**MSA Sec.303A**. requires that participation criteria for limited access privilege programs and regional fishery associations consider traditional fishing and processing, cultural and social frameworks, economic barriers to access, and community stability (MSA 2007). **MSA NS8** requires that management take into account the importance of fishery resources to fishing communities in order to provide for their sustained participation and minimize adverse community economic impacts. **Executive Order 13175** requires that federal agencies ensure meaningful and timely input by tribal officials in the development of regulatory policies affecting tribes EO 13175 2000). **Administrative Procedure Act (APA)** provides for public participation in the rulemaking process (DOJ 1946)	FMPs contain traditional and local and community knowledge in regulatory program development. Regional Management Council meetings are open and contain options for public comment. APA procedures result in periods of public review and comment for all stages of regulatory development. NMFS Office of Science and Technology maintains a database entitled the Local Fisheries Knowledge Project, focuses on collecting historical information pertaining to the marine environment and ecology for establishing baselines for habitat restoration or rebuilding fish stocks (NMFS 2007). The Economic and Social Sciences Research Program at the Alaska Fisheries Science Center maintains a database of traditional ecological knowledge of the North Pacific marine environment used in management analyses. (AFSC 2006).	

Topic of Pertinence #7: Traditional or community knowledge are acknowledged as important and required to be considered by MSA national standards and an executive order. It is a growing area of research within NOAA, which is expanding its social

scientific staff in regional offices, science centers and headquarters. I am not aware of independent reviews that assess the degree to which this area of knowledge is considered.

Topic of Pertinence #8: Best scientific evidence is used in management measures			
Type of Evidence	**Internal**	**Outcome**	**Independent**
Symbol Rating	●	●	●
Description	**MSA Sec 2 (8)** finds "the collection of reliable data is essential to the effective conservation, management and scientific understanding of the fishery resources of the United States" (MSA 2007) **MSA Sec 2** states as policy "to assure that the national fishery conservation and management program utilizes, and is based upon, the best scientific information available" **MSA Sec 302** requires all councils to maintain active scientific and statistical committees. **MSA NS 2** requires that conservation and management measures be based on the best scientific information available. Consistent with NS 2, FMPs must demonstrate that best available scientific data were used in the designation of essential fish habitat (EFH). **MMPA Sec. 3** requires the collection and application of biological information to serve as the best available scientific information for decision-making (COD 1972).	MSA NS 2 Guidelines describes scientific information required as basis for federal fishery management decisions to include biological, ecological, economic and social. MSA NS2 Guidelines describes the Stock Assessment and Fishery Evaluation (SAFE) Report, developed regularly as part of every FMP. Amendment 20 (trawl rationalization program) to the PFMC Groundfish Management Plan includes 100% on-board observer coverage of vessels and 100% monitoring of vessel onshore deliveries (PFMC 2014a). The 100% on-board observer coverage means that most interactions with ETP species should be recorded, and estimates of all interactions should be available.	Regional management councils Scientific and Statistical Committees (SSCs) comment on data adequacy for analysis. SSC reviews of stock assessments within each management council system. Additional reviews of stock assessments conducted independently of council regions, coordinated by the CIE. Example: In the Pacific council region, STAR panels provide independent transparent review of technical issues related to stock assessments, harvest controls and management. Rebuilding plans must be reviewed at least every two years (PFMC 2014a).

	ESA Sec. 4 requires that determinations of species' status and designations of critical habitat be made on the basis of the best scientific and commercial data available (DOI 1973).		

Discussion of Topic of Pertinence #8: The use of the best scientific information in decision-making is the foundational principle of U.S. federal fishery management. It is mentioned in the policy section of the MSA and required in the national standards for fishery management plans. Related legislation requiring coordination with MSA also requires the use of the best available scientific information. In practice, best scientific information forms the basis of all research and analysis supporting decision-making, and also provides a reference point against which those documents are reviewed. Independent reviews of management analyses explicitly consider whether the scientific information used is the best available.

Topic of Pertinence #9: Total fishing mortality from all sources is considered for the managed stock under consideration.			
Type of Evidence	**Internal**	**Outcome**	**Independent**
Symbol Rating	●	◒	◒
Description	**MSA NS 9** requires that conservation and management measures are to minimize bycatch and bycatch mortality, as well as to evaluate total fishing mortality (MSA 2007) **MSA Sec. 316** enables FMPs to explicitly incorporate bycatch into quotas	Consideration of bycatch during regulatory development Regional management councils databases on bycatch and bycatch mortality in many fisheries. Estimates of bycatch effects of regulations Bycatch monitoring through observer programs in some fisheries. Estimates of observed and unobserved fishing mortality are included in stock assessments (NOAA 1998). This may or may not include	Input data for stock assessments are reviewed by council SSCs as well as by outside independent review processes coordinated by CIE. NMFS system-wide workshops on improving stock assessments (cf. Mace et al. 2001) Observer Program based reviews of bycatch of groundfish and salmon in West Coast fisheries (Bellman et al. 2010a; 2010b)

		unreported catch, as noted in the terms of reference for the PFMC stock assessment and review process (PFMC 2012). Example: Objective 9 of the PFMC West Coast Groundfish FMP is to develop management programs that minimize bycatch and its mortality, reduce discard to the extent practicable, improve estimates of total fishing-related mortality and bycatch and other information necessary to determine the extent to which bycatch and bycatch mortality may be reduced (PFMC 2014a).	

Discussion of Topic of Pertinence #9: The MSA requires that information on all sources of fishing mortality be considered in stock assessment and management. The extent and methods by which bycatch and discard mortality are incorporated in to analyses varies across regions, primarily due to variation in data availability. Fisheries with observer programs and full logbook programs provide data in greater quantity and accuracy than those managed through other means. Bycatch sampling programs, data and estimates are subject to independent review to varying degree across fisheries.

Topic of Pertinence #10: Maximum sustainable yield or a proxy is used for management targets			
Type of Evidence	**Internal**	**Outcome**	**Independent**
Symbol Rating	●	●	●
Description	**MSA NS 1** requires that conservation and management prevent overfishing while achieving on a continuing basis optimal yield from the fishery. Each FMP must contain an MSY for stocks and stock complexes in the fishery (MSA 2007). **MSA Sec. 302** charges SSCs with making recommendations for	FMPs contain specifications of MSY and OY for managed species. Stock assessments are evaluated against the MSY management benchmark.	Stock assessments reviewed by council SSCs as well as by outside independent review processes coordinated by CIE.

	acceptable biological catch (ABC), maximum sustainable yield (MSY) and rebuilding targets for overfished stocks. **MSA Sec. 303** FMPs are required to specify the maximum sustainable yield and optimum yield from the fishery, as well as specify annual catch limits at a level to prevent overfishing. **ESA Sec. 4.f** recovery plans must contain measurable criteria to determine when a species has recovered (DOI 1973).		

Discussion of Topic of Pertinence #10: Maximum sustainable yield is the unifying standard across all U.S. federal fishery management. All managed fisheries are required to have MSY or an MSY proxy specified. MSY estimates are key components of stock assessments, and are reviewed by council SSCs and through external independent review processes.

Topic of Pertinence #11: Optimal utilization is promoted in management			
Type of Evidence	**Internal**	**Outcome**	**Independent**
Symbol Rating	●	◒	◒
Description	**MSA NS 1** requires that conservation and management prevent overfishing while achieving on a continuing basis optimal yield from the fishery (MSA 2007). **MSA Sec. 103** defines optimum yield as MSY reduced by economic, ecological or social factors. **MSA Sec. 303** FMPs are required to specify the maximum sustainable yield and optimum yield from the	FMPs contain specification of optimum utilization. E.g. Objective 9 of the PFC West Coast Groundfish Plan is to develop management measures that encourage full utilization (harvesting and processing) of groundfish resources by domestic fisheries. Social and economic analyses of options for optimum utilization are not regularly conducted	OY specifications are included in stock assessment reviews conducted by SSCs and other reviews coordinated by the CIE. These are generally biologically based. Public comment during Council meetings and at other points of the regulatory development process provide feedback on the acceptability of a FMPs notion of optimal utilization.

	fishery.		

Discussion of Topic of Pertinence #11: The MSY requires estimation of optimum yield, a reduction of MSY by ecological, economic or social factors. Some FMPs also consider how that yield is distributed over user groups, time, or markets, and contain explicit objectives for optimal utilization. However, even in cases where optimal utilization is listed as a management objective for a fishery, the definition of "optimal" tends to be one suiting the context of the fishery at the time the FMP is first developed, but not revisited or analyzed in comparison to alternative uses after the implementation of the plan. This type of analysis could be a component of the SAFE document but typically is not. Councils generally get feedback on public preferences for utilization from public testimony rather than systematic analyses. Other than public comment, questions of what comprises optimal utilization are not addressed through independent sources.

Topic of Pertinence #12: Food-web ecosystem considerations are considered			
Type of Evidence	**Internal**	**Outcome**	**Independent**
Symbol Rating	●	◒	●
Description	**MSA Sec 303** requires that FMPs list major prey species and their habitat location for species managed in the FMP (MSA 2007). **MSA NS 1** specifies that optimal yield include consideration of forage needs of the ecosystem, and other ecological factors such as predator-prey and competition among ecosystem components **ESA Sec.4** refers to protection of threatened or endangered species based on understanding the sources of threat: through control of predators or protection of food supply or other conservation practices (DOI 1973).	Fishery Ecosystem Plans Examples: PFMC Fishery Ecosystem Plan for implementation of ecosystem-based management. (PFMC 2013) NPFMC prevents directed fishing on 20 forage species, enacts Bering Sea/ Aleutian Island closure areas for marine mammal protection , developed the Aleutian Island Fishery Ecosystem Plan A Bering Sea Fishery Ecosystem Plan is currently in development (NPFMC 2007; NPFMC n.d.). NPFMC SAFE reports include an Ecosystem Considerations Report	The US Commission on Ocean Policy and the Pew Ocean Commission each reviewed U.S. fisheries, including the extent to which food-web ecosystem factors are considered (Pew 2003; USCOP 2004) NOAA Science Advisory Board conducted an External Review of NOAA's Ecosystem Research and Science Enterprise (Fluharty et al. 2006) World Wildlife Fund review of ecosystem-based management science, policy, and data in U.S. marine capture fisheries (Grieve and Short 2007) Review by Pitcher et al. (2009) of U.S. performance in

		(NPFMC 2014)	implementing ecosystem-based management.

Discussion of Topic of Pertinence #12: The extent to which food-web and larger ecosystem considerations are addressed in fishery management appears to vary by region, but I could find no overview information evaluating their consideration by region. Given the widespread interest in moving fisheries toward more ecosystem-based management there have been a number of independent reviews in this area.

Topic of Pertinence #13: Management specifies limits or directions in key performance indicators, e.g. overfishing			
Type of Evidence	**Internal**	**Outcome**	**Independent**
Symbol Rating	●	●	●
Description	**MSA Sec**. 303 requires that every FMP contain a mechanism for specifying annual catch limits at a level such that overfishing does not occur including measures to ensure accountability (MSA 2007). **MSA Sec. 303** requires the NMFS to report annually to congress on the status of stocks managed under federal FMPs. Stock status is described in relation to "overfishing" and "overfished." **MSA NS 1** requires that conservation and management prevent overfishing while achieving on a continuing basis optimal yield from the fishery. Each FMP must contain an MSY for stocks and stock complexes in the fishery. **NS 1 Guidelines** require specification of MSY, OY, Status	NMFS calculates The Fish Stock Sustainability Index (FSSI) for 227 stocks of commercial and recreational importance (NOAA 2013b). FMPs Fish Stock Rebuilding Plans Since 2012 all U.S. federally managed fisheries have ACLs in place (Rauch 2012) Annual Status of Stocks Report: MSA requirement to report to Congress (NOAA 2013b)	Regional external reviews of stock assessments CIE reviews of various aspects of fishery performance (Brown et al. 2006).

	Determination Criteria (SDC) related to "overfished" and "overfishing", incorporation of uncertainty in control rules, Annual Catch Limits (ACLs), and Accountability Measures (AMs), rebuilding plans for overfished stocks (NMFS 2009).		

Discussion of Topic of Pertinence #13: The specification of performance indicators such as overfishing is required of all FMPs. These are monitored on an annual basis for all fisheries and receive occasional external review. These requirements apply to the entire system of federal fishery management.

Topic of Pertinence #14: Actions are taken if limits are approached or exceeded			
Type of Evidence	**Internal**	**Outcome**	**Independent**
Symbol Rating	●	●	●
Description	**MSA Sec**. 303 requires that every FMP contain a mechanism for specifying annual catch limits at a level such that overfishing does not occur including measures to ensure accountability (MSA 2007). **MSA NS 1** requires that conservation and management prevent overfishing while achieving on a continuing basis optimal yield from the fishery. Each FMP must contain an MSY for stocks and stock complexes in the fishery. **NS 1 Guidelines** require rebuilding plans for overfished stocks. **ESA** requires development and implementation of	FMP accountability measures Rebuilding Plans for overfished stocks Recovery Plans for threatened or endangered species Annual Catch Limits (ACLs) in place for all federally managed fisheries since 2012 (Rauch 2012).	Various court cases litigating failure to act in timely manner to violations of limits. Active ENGO engagement in observing the fishery management system for potential failures to act.

	recovery plans with measurable criteria for recovery (NMFS 2009).		

Discussion of Topic of Pertinence #14: In recent years legal requirements of all FMPs to set "hard TACs" in the form of ACLs, and their accompanying requirements for rebuilding plans and accountability measures have improved management performance in this area throughout the system.

Topic of Pertinence #15: A goal of long-term sustainability is present			
Type of Evidence	**Internal**	**Outcome**	**Independent**
Symbol Rating	●	●	◒
Description	MSA contains several references to the long-term goal of sustainability (MSA 2007). **MSA Sec 2 (5)** finds that if fishery resources are placed under sound management before overfishing has caused irreversible effects, the fisheries can be conserved and maintained so as to provide optimum yields on a continuing basis. **MSA Sec 2 (6)** finds a national program is necessary to prevent overfishing, to rebuild overfished stocks, to insure conservation, to facilitate long-term protection of essential fish habitats ... **MSA Sec 3** defines "conservation and management" as necessary to assure that "irreversible or long-term adverse effects on fishery resources and the marine environment are avoided; and there will be a multiplicity of options available with	FMPs with specified long-term goals for the fishery Annual catch limits to prevent overfishing, with accountability measures Monitoring status of stocks for overfishing and overfished Rebuilding plans for overfished stocks Environmental impact statements to prevent long-term harm by federal action	OECD review of fishery rebuilding plans (Cox 2009). NRDC litigation of rebuilding plans provided legal finding that long-term goal of rebuilding should be prioritized over sort-term economic needs (NRDC vs. Evans 2003).

	respect to future uses …" **MSA NS 1** requires that conservation and management prevent overfishing while achieving on a continuing basis optimal yield from the fishery. **NEPA Sec 102** defines an environmental impact statement (EIS) as a detailed statement "analyzing the environmental impacts of a proposed action, adverse effects of the project that cannot be avoided, alternative courses of action, short-term uses of the environment versus the maintenance and enhancement of long-term productivity, and any irreversible and irretrievable commitment of resources" (DOE 1969).		

Discussion of Topic of Pertinence #15: The MSA contains many references to the goal of long-term sustainability of stocks and the conditions required to achieve it. Several operational requirements of fishery management are designed to promote achievement of that goal. External reviews of long-term sustainability have tended to be driven by contestation of rebuilding plans. It is unclear how widespread these independent reviews are across fishery management regions.

Topic of Pertinence #16: Framework for fisheries at local, regional or national level			
Type of Evidence	**Internal**	**Outcome**	**Independent**
Symbol Rating	●	●	●
Description	The various laws under which U.S. fishery management is conducted provide a detailed legal and administrative framework. **MSA** sets out an elaborate framework for	Eight regional fishery management councils with scientific advice and public participation (MSA 2007) NMFS headquarters, regional science centers, regional offices	Public membership on councils Public participation in council meetings Transparency of procedures and documents

	regional fishery management under the umbrella authority of the Secretary of Commerce. **MSA Title III** National Fishery Management Program includes detailed requirements under which management and conservation is conducted: national standards (Sec. 301), regional fishery management councils (Sec. 302), fishery management plans (Sec. 303), federal-state management interaction (Sec. 306), Procedures (Secs. 304, 305, 307-310), enforcement (Sec. 311), and various specific programs. **Title IV** provides a framework for fishery monitoring and research (MSA 2007). **APA** provides a procedural structure for decision-making (DOJ 1946). **RFA** provides a procedural structure to assess impacts on small businesses (FR 1980). **NEPA** provides detailed description of the assessment of environmental outcomes of federal actions (DOE 1973). **ESA** provides a framework for assessing species status and taking actions to recover those which are threatened and endangered (DOI 1973).	Detailed analyses of proposed management actions Public notice and comment during regulatory development	At-large membership on scientific advisory bodies and other advisory committees

Discussion of Topic of Pertinence #16: The framework for U.S. fisheries is detailed and transparent. It is a regional system of state-federal coordination, based on science advice, and providing for stakeholder participation and public input.

Topic of Pertinence #17: Compliance ensured via monitoring and enforcement			
Type of Evidence	**Internal**	**Outcome**	**Independent**
Symbol Rating	●	●	◒
Description	**MSA Sec 311** (domestic enforcement) MSA provisions to be enforced by the Secretaries of Commerce and Homeland Security, using assets of Department of Defense, federal agencies and state agencies (MSA 2007). **MSA Sec. 311** includes provisions for improved data sharing between federal and state enforcement entities. **MSA Sec 301** National Standards **MSA Sec 606** (high seas driftnet moratorium enforcement) enables assets of the Department of Defense, Coast Guard, and other federal agencies to detect, monitor, and prevent violations of the UN moratorium on large-scale driftnet fishing on the high seas for all fisheries. .	Compliance data monitoring: permits, logbook and fish tickets Observer vessel coverage in many fisheries Vessel monitoring systems (VMS) USCG and NMFS OLE vessel boardings at sea and in port Examples: The MSA provides for civil and criminal penalties for fisheries violations. At-sea and shore-side enforcement is carried out by the state fish and wildlife agencies NMFS Office of Law Enforcement (OLE), and the US Coast Guard (USCG). State and federal fisheries enforcement officers make use of USCG vessels to assist in surveillance and enforcement (MSA 2007). National policy of penalties and sanctions (NMFS 2011b) PFMC Enforcement Consultants standing committee is composed of representatives from	Observer system coverage documenting catch, bycatch, gear use, location fished Data crosschecks and verification Not all fisheries have observer coverage Some catch reporting systems are vulnerable to underreporting or misreporting

		state police agencies, state fish and wildlife agencies, NMFS regions, and the U.S. Coast Guard. They advise the Council about the enforceability of proposed management actions and their potential impact on safety at sea (PFMC 2014c).	

Discussion of Topic of Pertinence #17: Monitoring and enforcement are embedded in the legal requirements for fishery management, as well as in the routine of council operations. The extent to which there is external independent monitoring of compliance varies across regions according to whether fisheries have observer coverage of vessels. Some catch reporting systems are vulnerable to underreporting or misreporting

Topic of Pertinence #18: Stock is not overfished			
Type of Evidence	**Internal**	**Outcome**	**Independent**
Symbol Rating	●	◒	◒
Description	**MSA Sec. 3** defines conservation and management as measures required to rebuild, restore or maintain fishery resources and the marine environment (MSA 2007). **MSA NS 1** requires that conservation and management prevent overfishing while achieving on a continuing basis optimal yield from the fishery. Each FMP must contain an MSY for stocks and stock complexes in the fishery. **MSA NS 1 Guidelines** describe detailed conditions and procedures for setting control rules to prevent overfishing, determining whether stocks are overfished, and developing rebuilding	NMFS calculates The Fish Stock Sustainability Index (FSSI) for 227 stocks of commercial and recreational importance (NOAA 2013). Annual Status of Stocks Report to Congress (NOAA 2013). Regular Stock Assessment and Fishery evaluation (SAFE) reports under FMPs NMFS system-wide workshops on improving stock assessments (cf. Mace et al. 2001) Fish Stock Rebuilding Plans Outcomes vary by council regions.	OECD review of the economics of rebuilding plans (Cox 2009). Milazzo (2012) review of rebuilding plans NRC (2013) review of the effectiveness of rebuilding plans.

	strategies once overfished status is determined. **MSA Sec. 302** charges SSCs with making recommendations for acceptable biological catch (ABC), maximum sustainable yield (MSY) and rebuilding targets for overfished stocks. **MSA Sec. 303** FMPs are required to specify the maximum sustainable yield and optimum yield from the fishery, as well as specify annual catch limits at a level to prevent overfishing. **MSA** requires the NMFS to report annually to congress on the status of stocks managed under federal FMPs. Stock status is described in relation to "overfishing" and "overfished." **MSA** requires rebuilding plans to be developed for overfished stocks		

Discussion of Topic of Pertinence #18: The federal management system is required to prevent fish stocks from becoming overfished, or in the case of being overfished, to rebuild them. A number of checks and balances in the operation of management are designed to ensure that this requirement is met, and active monitoring of the extent to which it is met. Success has varied across regions. The extent of independent review of overfished stocks is limited.

Topic of Pertinence #19: Long-term changes in productivity are considered			
Type of Evidence	**Internal**	**Outcome**	**Independent**
Symbol Rating	◒	○	○
Description	Consideration of long-term changes in productivity is presently not a requirement of FMPs but is conducted		

	on an ad hoc basis by some fishery science centers and council regions. Example: the NPFMC implementation of precautionary measures to address potential long term changes in stock productivity resulting from fishing and nonfishing factors (NPFMC 2005).		

Discussion of Topic of Pertinence #19: Consideration of long-term changes in productivity is not presently a requirement of FMPs but is incorporated into some. I am not aware of information about long-term productivity based on outcomes or independent reviews.

Topic of Pertinence #20: Restoration of stocks is required within a reasonable time frame			
Type of Evidence	**Internal**	**Outcome**	**Independent**
Symbol Rating	●	●	●
Description	**MSA Sec. 104** requires that councils "specify a time period for ending overfishing and rebuilding the fishery that shall--(i) be as short as possible, taking into account the status and biology of any overfished stocks of fish, the needs of fishing communities, recommendations by international organizations in which the United States participates, and the interaction of the overfished stock of fish within the marine ecosystem; and (ii) not exceed 10 years, except in cases where the biology of the stock of fish, other	Regional fishery management council rebuilding plans Annual reports to congress on rebuilding progress Marine mammal take reduction plans Recovery plans for ESA-listed species	Litigation of rebuilding plans (cf. NRDC vs. Evans 2003) Review of progress toward ecosystem-based management (Pitcher et al. 2006) OECD review of economics and rebuilding plans (Cox 2009) Milazzo (2012) review of rebuilding plans NRC (2013) review of the effectiveness of rebuilding plans

	environmental conditions, or management measures under an international agreement in which the United States participates dictate otherwise (MSA 2007). **MSA NS 1 Guidelines** describe detailed conditions and procedures for setting control rules to prevent overfishing, determining whether stocks are overfished, and developing rebuilding strategies once overfished status is determined (NMFS 2009). **MSA Sec. 302** charges SSCs with making recommendations for acceptable biological catch (ABC), maximum sustainable yield (MSY) and rebuilding targets for overfished stocks. **ESA Sec 4** charges that recovery plans for threatened or endangered species include estimates of the time required and the cost to carry out recovery measures (DOI 1973). **MMPA Sec 118** the take reduction plan "shall include measures the Secretary expects will reduce, within 6 months of the plan's implementation, such mortality and serious injury to a level below the potential biological removal level" (DOC 1972).		

Discussion of Topic of Pertinence #20: The management system contains detailed prescriptions for rebuilding overfished stocks, and their condition is monitored on an annual basis. The time frame for rebuilding has been subject to active independent review.

Topic of Pertinence #21: Stock structure's contribution to resilience is considered			
Type of Evidence	**Internal**	**Outcome**	**Independent**
Symbol Rating	●	●	●
Description	Stock structure: age structure is a key data element of stock assessments. Data are generated through at-sea research sampling, at-sea catch (retained and bycatch), and landed catch. Resilience: **MSA NS 2 Guidelines** detail contents of the SAFE, which "provides information to the Councils for determining annual harvest levels from each stock, documenting significant trends or changes in the resource, marine ecosystems, and fishery over time, and assessing the relative success of existing state and Federal fishery management programs" (NMFS 2009).	Stock assessments using age-structured models Annual SAFE reports Stock assessments and SAFE reports undergo annual review by technical teams and SSCs within the council system.	Stock assessments and SAFE reports are subject to regular independent regional reviews as well as ad hoc reviews coordinated by the CIE.

Discussion of Topic of Pertinence #21: Age structure is a key consideration of stock assessments, and its role in contributing to stock resilience is reviewed regularly within the council system and, less regularly, independent of it.

Topic of Pertinence #22: Generic evidence based on similar stock situations			
Type of Evidence	**Internal**	**Outcome**	**Independent**
Symbol Rating	●	●	●
Description	**MSA Sec. 301** NS 1 allows interrelated stocks to be managed as	FMPs contain descriptions and justifications for chosen	Annual stock assessment review process considers

	a unit or in close coordination (MSA 2007) **NS1 Guidelines** define an "indicator stock" as representative of each stock within the complex, used to help evaluate and manage stocks about which less is known. More than one indicator stock can be used for a given complex. Use of indicator stocks requires periodic re-evaluation of available qualitative or quantitative information to determine whether stock is approaching or has reached an overfished condition (NMFS 2009).	indicator stocks.	appropriateness of indicator stock selection and level of risk associated with using their information in modeling or decision-making. Regional stock assessment reviews coordinated through the CIE include consideration of indicator stocks. Two independent reviews raise questions about the mixed-stock exemption in relation to overfishing (Gaichas et al. 2012; NRC 2013)

Discussion of Topic of Pertinence #22: The question of indicator stock selection and level of risk associated with using their information in modeling or decision-making is an active one within the fishery management system. It is subject to regular review and discussion in the review of stock assessments that contain indicator stocks. The "mixed-stock exemption" is a controversial issue that has generated external independent review.

Topic of Pertinence #23: Non-target catch and discards are not threatened by the target fishery			
Type of Evidence	**Internal**	**Outcome**	**Independent**
Symbol Rating	●	●	◒
Discussion of Description	**MSA Sec. 301**: "Any FMP prepared shall be consistent with the following national standards…(N.S.)" 1: prevent overfishing; 2 based on best available scientific information; 3. Individual stocks managed throughout their range; 6. Take into account variations and contingencies in fisheries, fishery resources and catches; 9. Minimize bycatch and mortality of bycatch	Consideration of bycatch during regulatory development Regional management councils databases on bycatch and bycatch mortality in many fisheries. Estimates of bycatch effects of regulations Bycatch monitoring through observer programs in some fisheries.	Milazzo (2012) citing a survey identifying bycatch of overfished stocks. Various ENGO reports citing damage caused by bycatch of overfished stocks.

	(MSA 2007). **MSA NS 9** requires that conservation and management measures are to minimize bycatch and bycatch mortality, as well as to evaluate total fishing mortality **MSA Sec. 316** enables FMPs to explicitly incorporate bycatch into quotas	logbooks Estimates of observed and unobserved fishing mortality are included in stock assessments (NOAA 1998). This may or may not include unreported catch, as noted in the terms of reference for the PFMC stock assessment and review process (PFMC 2012a). Area closures, such as the PFMC Rockfish Conservation Areas (PFMC 2012b) U.S. National Bycatch Report (Na) with 2014 update: continued improvements in bycatch reduction and bycatch reporting. However bycatch is still a problem in many fisheries. MSA Sec. 306 Bycatch Reduction Engineering Program Economic incentives to reduce bycatch through tradable bycatch quotas Full retention/full utilization regulations in some fisheries	

Discussion of Topic of Pertinence #23: Bycatch and discards are subject to active attention within the fishery management system. A number of different approaches have been developed to minimize bycatch and address the problem of discards. These approaches vary by fishery and by region. The issue has also received attention from ENGOs who feel progress in addressing the problem has been unacceptably slow.

Topic of Pertinence #24: Knowledge exists of essential habitats for managed stocks			
Type of Evidence	**Internal**	**Outcome**	**Independent**
Symbol Rating	●	●	◒

Description	**MSA Sec 2 (6)** finds a national program is necessary to prevent overfishing, to rebuild overfished stocks, to insure conservation, to facilitate long-term protection of essential fish habitats ..." (MSA 2007) **MSA Sec. 3 (5)**: Conservation and management designed to ensure that irreversible or long-term adverse side effects on fishery resources and the marine environment area avoided. **Sec 3(33)**: optimum yield takes into account the protection of marine ecosystems. **Sec. 302**: FMPs should take into account the interaction of the overfished stock of fish within the marine ecosystem. **Secs. 303 and 305:** FMPs must describe and identify essential fish habitat, including identifying and minimization of adverse impacts of fishing on such habitat. Consistent with **MSA NS 2**, FMPs must demonstrate that best available scientific data were used in the designation of essential fish habitat (EFH). **ESA Sec 4** requires the requiring the identification and protection of all lands, water and air necessary to recover endangered species, which is considered to be critical habitat (DOI 1973).	FMP EFH descriptions NMFS Marine Fisheries Habitat Assessment Improvement Plan (NOAA 2010) Example: Amendment 19 of Pacific Coast Groundfish Fishery Management Plan created Essential Fish Habitat Conservation Areas (EFHCAs) of the U.S. West Coast Exclusive Economic Zone that resulted in 130,000 sq. mi. of habitat off limits to bottom trawling (PFMC 2014a).	CIE (2004) review of EFH in Alaska

Discussion of Topic of Pertinence #24: Documentation and mapping efforts in all council regions have generated comprehensive information about habitats off managed stocks. Independent reviews of habitat information appear to be limited.

SUMMARY FINDINGS

Table 1. Summary ratings of management system conformance to the FAO eco-labeling Guidelines. Conformance of each topic is described with ● indicating conformance verified by internal evidence, ●● by outcome evidence, and ●●● by independent evidence. Solid symbols (●) indicate strong evidence in all regions and for all fisheries under NOAA Fisheries jurisdiction, and semi-solid symbols (◒) indicate conformance with variable evidence among regions or fisheries (i.e., strong evidence in some but not in others). INT = internal evidence; OUT = outcome evidence; IND = independent evidence

	Topics of Pertinence	Evidence INT	OUT	IND
1	Management system is in compliance with relevant local, national, and international laws	●	●	●
2	There are documented management approaches for the "stock under consideration"	●	●	●
3	Uncertainty taken into account via risk assessment or precautionary approach	●	●	●
4	Ecosystem effects of fishing are assessed and adverse effects addressed	●	●	●
5	Types and scales of fisheries considered in management	●	●	●
6	Adequate/reliable data are collected, maintained and assessed	●	◒	●
7	Traditional, fisher or community knowledge considered	●	●	○
8	Best scientific evidence used in management measures	●	●	●
9	Total fishing mortality from all sources considered for the managed stock under consideration	●	◒	◒
10	Maximum sustainable yield or proxy used for management targets	●	●	●
11	Optimal utilization is promoted in management	●	◒	◒
12	Food-web ecosystem considerations considered	●	◒	●
13	Management should specify limits or directions in key performance indicators, e.g. overfishing	●	●	●
14	Actions taken if limits approached or exceeded	●	●	●
15	Goal of long-term sustainability present	●	●	◒
16	Framework for fisheries at local, national or regional level	●	●	●
17	Compliance ensured via monitoring and enforcement	●	●	◒
18	Stock is not overfished	●	◒	◒
19	Long-term changes in productivity considered	◒	○	○
20	Restoration of stocks required within reasonable time frames	●	●	●
21	Stock structure contributing to resilience considered	●	●	●
22	Generic evidence based on similar stock situations	●	●	●

23	Non-target catch and discards not threatened by target fishery	● ● ◒
24	Knowledge of the essential habitats for managed stocks	● ● ◒

CONCLUSIONS AND RECOMMENDATIONS FOR THE METHODOLOGY

General Considerations

The "framework assessment" document (Walsh and Lassen 2014) is an ambitious and comprehensive undertaking. It states the intent that the assessment process be a tool for the fishery management system to systematically evaluate, communicate and guide the sustainability of fisheries. While this is a laudable goal, it is probably too ambitious an expectation for a single assessment tool. The assessment tool can assist in evaluating performance in specified areas and provide a framework for communicating performance results. However, guiding a system toward sustainability is a much more complex endeavor. To take action to address performance gaps, the system will need to evolve within its existing opportunities and constraints, none of which will necessarily be identified in the course of framework evaluation. I recommend that the framework limit its statement of intent to the evaluation and communication objectives.

I present some specific considerations for the evaluation and communication objectives in the "Specific Considerations" section.

A weakness of the framework document is that, like the FAO guidelines, it limits its focus to the biological dimensions of sustainability. The document explains the limitation based on the focus of the FAO report. It acknowledges that the biological perspective on sustainability is a narrow one that excludes the human dimensions of economic and social dynamics. However, while acknowledging this limitation in the introduction, the document goes on to use the general term "sustainability" throughout, and to assert that the evaluation takes a system-level approach to sustainability. In actuality the subject of the evaluation is much more narrowly focused on the biological elements of sustainability.

Human dimensions of sustainability entail far more than the human impacts of regulatory action, as required by National Standards 5, 6, 7 and 8 in the U.S. system. More broadly, a wide range of human behaviors and the incentives that motivate them are fundamental to achieving sustainability.

Two of the Topics of Pertinence are directly related to people as part of fishing systems of fisheries (5. Types and scales of fisheries are considered in management; 7. Traditional or community knowledge considered), but these address only a small subset of the human dimensions of fishery sustainability, and it is unclear why these two are selected or what information they are expected to convey about biological sustainability. With regard to #7, the FAO condition that the traditional or community knowledge not simply be considered but be verifiable seems to have been lost in the tracking of the guidelines to the framework. Verification and documentation are necessary elements of any data used as a basis for management decision-making.

For the framework to truly assess system-level sustainability it will need to be broadened to include the human side of fisheries. Alternatively, it can be made clear in the

methodology document that the assessment is confined to the biological dimensions of sustainability. The focus on biological dimensions would be consistent with existing third party eco-certification programs as well as the FAO guidelines.

Specific Considerations

I applaud the authors and the Office of Sustainable Fisheries for beta testing the framework. It is only in the course of implementing a methodology that strengths and weaknesses come to light. Based on my test of implementation I present some recommendations as considerations for further developing the assessment tool. These considerations pertain to the evaluation and communication functions of the framework.

Evaluation

Level of Focus: The structure of U.S. is one of regional management under centralized guidance and control. By intent, it is a system characterized by wide variations among regions in management approach. When working through the framework, it was often clear that while "internal evidence" might be consistent throughout the eight council regions, "output evidence" and "independent verification" vary across regions. This difference makes it difficult to perform a "system-level" assessment. Additionally, as I note in my evaluation, for some Topics of Pertinence the evaluator could present evidence of outputs or independent verification within one or two council regions but might not have evidence about other regions.

Given the explicitly regional structure of the U.S. management system, I recommend that the framework be developed to apply to management within each regional system, or even at a less aggregated FMP level. Performance varies not only across management regions, but also across FMPs within a single management region.

Conduct: Who would perform these evaluations? Are you anticipating them to be conducted internal to the regional system or independent of it?

Structure: If the intent is to use the framework as a tool to assess performance of management in regions or individual FMPs, its effectiveness will be improved through some refinements of its structure. The framework document is presently referential to and derivative of the FAO eco-labeling guidance. To better implement the framework within the regional structure of the U.S. fishery management system, more emphasis could be placed on the U.S. management context, for example by phrasing indicators in language that is operationally familiar to the U.S. system.

The structure and influence of the FAO approach could be explained in a background section of the framework document, including cross-referencing of indicators.

Indicators: Some of the Topics of Pertinence cover similar territory but appear at different points in the document; for example 1 and 16; 12 and 24; 6 and 8. These could be reorganized into subject area clusters. Reducing the number of indicators would also

be helpful. In terms of communicating results it is difficult to track performance over 24 dimensions. The same information could be represented in a smaller number of indicators that combine like elements of the existing list.

Evaluation Scope: The framework could be broadened in scope to do more to represent the human dimensions of sustainability. This would entail developing indicators that assess economic and social elements; e.g. economic status of the fishery, social inclusion, and the alignment of incentives. A broader scope would admittedly differentiate the evaluation from the FAO Guidelines and third party certifications, but would be more consistent with the integrated management of the U.S. system.

The framework document should clarify whether it is intended to apply only to federally managed fisheries or to all fisheries. I base my assessment on the U.S. federal fishery management system, but the example provided in Table 4 of Walsh and Lassen (2014) is a state-managed fishery. Fisheries in state waters are managed in coordination with the federal management, but with variations in applicable legislation, policies and regulations. A statement in the framework assessment clarifying the intended scope is needed.

Communication

Language: Putting the framework into practice in a manner that will yield consistent results across evaluators will require that the document be user-friendly and clearer in its definitions and intent. Emphasis should be placed on presenting the evaluation framework in clear and communicative language. For example, "topics of pertinence" is an awkward term that is not particularly specific as to intent. The "topics of pertinence" are really indicators, so why not call them that? This was already done in the background section of the TORs, where they are called "benchmark indicators."

Definitions: Some topics of pertinence are expressed in cryptic form and could usefully be rephrased in a more descriptive way and to clearly express intent. For example, "generic evidence based on similar stock situations" does not immediately convey a specific meaning. Rephrasing the indicators to have consistent word structure would also be helpful.

Specific terms also need to be well defined to avoid varying interpretations. For example, "reasonable time frame" for rebuilding is a subjective term open to various interpretations. Defining what is meant by "reasonable" would be helpful.

Terms: the term "Science and Statistical Committee " appears throughout the document. The correct term is "Scientific and Statistical Committee." "Traditional knowledge" or "community knowledge" should also be defined. The "if verifiable" condition should be included with these terms.

APPENDIX 1. LITERATURE CITED

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APPENDIX 2. CIE STATEMENT OF WORK

Attachment A: Statement of Work for Dr. Susan Hanna

External Independent Peer Review by the Center for Independent Experts

COMPARATIVE ANALYSIS OF U.S. FEDERAL FISHERY MANAGEMENT TO THE FAO ECOLABELLING GUIDELINES

Scope of Work and CIE Process: The National Marine Fisheries Service's (NMFS) Office of Science and Technology coordinates and manages a contract providing external expertise through the Center for Independent Experts (CIE) to conduct independent peer reviews of NMFS scientific projects. The Statement of Work (SoW) described herein was established by the NMFS Project Contact and Contracting Officer's Technical Representative (COTR), and reviewed by CIE for compliance with their policy for providing independent expertise that can provide impartial and independent peer review without conflicts of interest. CIE reviewers are selected by the CIE Steering Committee and CIE Coordination Team to conduct the independent peer review of NMFS science in compliance the predetermined Terms of Reference (ToRs) of the peer review. Each CIE reviewer is contracted to deliver an independent peer review report to be approved by the CIE Steering Committee and the report is to be formatted with content requirements as specified in **Annex 1**. This SoW describes the work tasks and deliverables of the CIE reviewer for conducting an independent peer review of the following NMFS project. Further information on the CIE process can be obtained from www.ciereviews.org.

Project Description:

NMFS has developed a methodology to assess the sustainability of a fishery management system and has applied the methodology to U.S. federal marine fishery management. CIE reviewers would conduct an independent assessment of the U.S. federal marine fishery management system using the methodology provided. This assessment can act as a tool for NMFS to systematically document, communicate, and guide the sustainable management of U.S. federal fisheries. NMFS leadership believes that an independent assessment would be valuable for describing evidence of conformance between U.S. fishery intentions and performance, and the FAO Ecolabelling Guidelines. The Terms of Reference (ToRs) of the peer review are attached in **Annex 2**.

Requirements for CIE Reviewers: Three CIE reviewers shall conduct an impartial and independent peer review in accordance with the SoW and ToRs herein. CIE reviewers shall have working knowledge and recent experience in the application of fisheries management and/or stock assessment science, particularly with knowledge of the U.S. federal marine fishery management system (i.e., via NOAA and the Regional Fishery Management Councils) and associated legislation/regulation (i.e., the Magnuson–Stevens Fishery Conservation and Management Act, the Marine Mammal Protection Act, the Endangered Species Act, etc.). Each CIE reviewer's duties shall not exceed a maximum of 10 days to complete all work tasks of the peer review described herein.

Location of Peer Review: Each CIE reviewer shall conduct an independent peer review as a desk review, therefore no travel is required.

Statement of Tasks: Each CIE reviewers shall complete the following tasks in accordance with the SoW and Schedule of Milestones and Deliverables herein.

Prior to the Peer Review: Upon completion of the CIE reviewer selection by the CIE Steering Committee, the CIE shall provide the CIE reviewer information (full name, title, affiliation, country, address, email) to the COTR, who forwards this information to the NMFS Project Contact no later the date specified in the Schedule of Milestones and Deliverables. The CIE is responsible for providing the SoW and ToRs to the CIE reviewers. The NMFS Project Contact is responsible for providing the CIE reviewers with the background documents, reports, and other pertinent information. Any changes to the SoW or ToRs must be made through the COTR prior to the commencement of the peer review.

Pre-review Background Documents: Two weeks before the peer review, the NMFS Project Contact will send (by electronic mail or make available at an FTP site) to the CIE reviewers the necessary background information and reports for the peer review. In the case where the documents need to be mailed, the NMFS Project Contact will consult with the CIE Lead Coordinator on where to send documents. CIE reviewers are responsible only for the pre-review documents that are delivered to the reviewer in accordance to the SoW scheduled deadlines specified herein. The CIE reviewers shall read the following documents in preparation for the peer review.

1. *Framework Assessment of Sustainability: Methodology for Evaluating the Conformance of Fishery Management Systems to FAO's Guidelines for Ecolabelling* (~35 pp).
2. Examples of U.S. federal fishery management statutes and regulations relevant to addressing biological sustainability as outlined in the "Minimum Substantive Requirements" of the FAO's *Guidelines for the Ecolabelling of Fish and Fishery Products from Marine Capture Fisheries.* (~70 pp).

Desk Review: Each CIE reviewer shall conduct the independent peer review in accordance with the SoW and ToRs, and shall not serve in any other role unless specified herein. **Modifications to the SoW and ToRs can not be made during the peer review, and any SoW or ToRs modifications prior to the peer review shall be approved by the COTR and CIE Lead Coordinator.** The CIE Lead Coordinator can contact the Project Contact to confirm any peer review arrangements.

Contract Deliverables - Independent CIE Peer Review Reports: Each CIE reviewer shall complete an independent peer review report in accordance with the SoW. Each CIE reviewer shall complete the independent peer review according to required format and content as described in Annex 1. Each CIE reviewer shall complete the independent peer review addressing each ToR as described in Annex 2.

Specific Tasks for CIE Reviewers: The following chronological list of tasks shall be completed by each CIE reviewer in a timely manner as specified in the **Schedule of Milestones and Deliverables**.

1) Conduct necessary pre-review preparations, including the review of background material and reports provided by the NMFS Project Contact in advance of the peer review.
2) Conduct an independent peer review in accordance with the ToRs (**Annex 2**).
3) No later than REPORT SUBMISSION DATE, each CIE reviewer shall submit an independent peer review report addressed to the "Center for Independent Experts," and sent to Dr. Manoj Shivlani, CIE Lead Coordinator, via email to shivlanim@bellsouth.net, and Dr. David Sampson, CIE Regional Coordinator, via email to *david.sampson@oregonstate.edu*. Each CIE report shall be written using the format and content requirements specified in Annex 1, and address each ToR in **Annex 2**.

Schedule of Milestones and Deliverables: CIE shall complete the tasks and deliverables described in this SoW in accordance with the following schedule.

August 1, 2014	CIE sends reviewer contact information to the COTR, who then sends this to the NMFS Project Contact
September 24, 2014	NMFS Project Contact sends the CIE Reviewers the report and background documents
September 24 – October 8, 2014	Each reviewer conducts an independent peer review as a desk review
September 8, 2014	CIE reviewers submit draft CIE independent peer review reports to the CIE Lead Coordinator and CIE Regional Coordinator
October 17, 2014	CIE submits the CIE independent peer review reports to the COTR
October 24, 2014	The COTR distributes the final CIE reports to the NMFS Project Contact and the Office of Sustainable Fisheries

Modifications to the Statement of Work: This 'Time and Materials' task order may require an update or modification due to possible changes to the terms of reference or schedule of milestones resulting from the fishery management decision process of the NOAA Leadership, Fishery Management Council, and Council's SSC advisory committee. A request to modify this SoW must be approved by the Contracting Officer at least 15 working days prior to making any permanent changes. The Contracting Officer will notify the COTR within 10 working days after receipt of all required

information of the decision on changes. The COTR can approve changes to the milestone dates, list of pre-review documents, and ToRs within the SoW as long as the role and ability of the CIE reviewers to complete the deliverable in accordance with the SoW is not adversely impacted. The SoW and ToRs shall not be changed once the peer review has begun.

Acceptance of Deliverables: Upon review and acceptance of the CIE independent peer review reports by the CIE Lead Coordinator, Regional Coordinator, and Steering Committee, these reports shall be sent to the COTR for final approval as contract deliverables based on compliance with the SoW and ToRs. As specified in the Schedule of Milestones and Deliverables, the CIE shall send via e-mail the contract deliverables (CIE independent peer review reports) to the COTR (William Michaels, via William.Michaels@noaa.gov).

Modifications to the Statement of Work: This 'Time and Materials' task order may require an update or modification due to possible changes to the terms of reference or schedule of milestones resulting from the fishery management decision process of the NOAA Leadership, Fishery Management Council, and Council's SSC advisory committee. A request to modify this SoW must be approved by the Contracting Officer at least 15 working days prior to making any permanent changes. The Contracting Officer will notify the COTR within 10 working days after receipt of all required information of the decision on changes. The COTR can approve changes to the milestone dates, list of pre-review documents, and ToRs within the SoW as long as the role and ability of the CIE reviewers to complete the deliverable in accordance with the SoW is not adversely impacted. The SoW and ToRs shall not be changed once the peer review has begun.

Acceptance of Deliverables: Upon review and acceptance of the CIE independent peer review reports by the CIE Lead Coordinator, Regional Coordinator, and Steering Committee, these reports shall be sent to the COTR for final approval as contract deliverables based on compliance with the SoW and ToRs. As specified in the Schedule of Milestones and Deliverables, the CIE shall send via e-mail the contract deliverables (CIE independent peer review reports) to the COTR (William Michaels, via William.Michaels@noaa.gov).

Support Personnel:

Allen Shimada
NMFS Office of Science and Technology
1315 East West Hwy, SSMC3, F/ST4, Silver Spring, MD 20910
Allen Shimada@noaa.gov Phone: 301-427-8174

William Michaels
NMFS Office of Science and Technology
1315 East West Hwy, SSMC3, F/ST4, Silver Spring, MD 20910
William.Michaels@noaa.gov Phone: 301-427-8155

Manoj Shivlani, CIE Lead Coordinator
NTVI Communications
10600 SW 131st Court, Miami, FL 33186
shivlanim@bellsouth.net Phone: 305-968-7136

Key Personnel:

NMFS Project Contact:

Seema Balwani
NMFS Office of Sustainable Fisheries, Domestic Fisheries Division,
1315 East West Highway, Silver Spring, MD 20910;
seema.balwani@noaa.gov Phone: 301-427-8563;

Annex 1: Format and Contents of CIE Independent Peer Review Report

1. The CIE independent report shall be prefaced with an Executive Summary providing a concise summary of the findings and recommendations, and specify whether the science reviewed is the best scientific information available.

2. The main body of the reviewer report shall consist of a Background, Description of the Individual Reviewer's Role in the Review Activities, Summary of Findings for each ToR in which the weaknesses and strengths are described, and Conclusions and Recommendations in accordance with the ToRs.

3. The reviewer report shall include the following appendices:

   Appendix 1: Bibliography of materials provided for review
   Appendix 2: A copy of the CIE Statement of Work

Annex 2: Tentative Terms of Reference for the Peer Review

COMPARATIVE ANALYSIS OF U.S. FEDERAL FISHERY MANAGEMENT TO THE FAO ECOLABELLING GUIDELINES

Background

The National Oceanic and Atmospheric Administration (NOAA) Fisheries Service and many U.S. fishing industry groups believe that U.S. fisheries are sustainably managed under the strict mandates of the Magnuson-Stevens Fishery Conservation and Management Act, the Marine Mammal Protection Act, and the Endangered Species Act; however, U.S. consumers hear conflicting messages about the sustainability of U.S. seafood. This assessment will illustrate conformance between the NOAA Fisheries management system and internationally-accepted guidelines for sustainability adopted by the Food and Agriculture Organization of the United Nations (FAO).

The methodology, co-developed by NOAA Fisheries, is based on the 2010 FAO *Draft Evaluation Framework to Assess the Conformity of Public and Private Ecolabelling Schemes with the FAO Guidelines for the Ecolabelling of Fish and Fishery Products from Marine Capture Fisheries*, which provides benchmarking indicators to validate fishery management systems' conformity with the 2009 United Nations FAO *Guidelines for Ecolabelling of Fish and Fishery Products from Marine Capture Fisheries* (Ecolabelling Guidelines).

Objective

Conduct a conformance assessment of the U.S. federal marine fishery management system (i.e., via NOAA Fisheries and the Regional Fishery Management Councils) using the methodology described in *Framework Assessment of Sustainability: Methodology for Evaluating the Conformance of Fishery Management Systems to FAO's Guidelines for Ecolabelling*.

Outputs

To this end, CIE reviewers will apply the methodology described in *Framework Assessment of Sustainability: Methodology for Evaluating the Conformance of Fishery Management Systems to FAO's Guidelines for Ecolabelling* to assess conformance of the U.S. federal marine fishery management system to each of 25 Topics of Pertinence, i.e. -

For each Topic of Pertinence:

1. Generate a table (as described by Table 3 in *Framework Assessment of Sustainability*) documenting evidence of intention, performance, and independent verification of U.S. federal marine fishery management conformance.
    i. In assessing intentions (i.e., internal evidence), the document of example statutes and regulations provided (in the pre-review background documents) may serve as the basis for conformance evidence. Additional legislative and regulatory evidence may also be provided per the reviewer's knowledge and expertise.

ii. In assessing performance (i.e., outcome evidence) and independent verification (i.e., independent evidence), examples shall be derived from the reviewer's knowledge and expertise of the U.S. federal marine fishery management system.

2. Rate U.S. federal fishery management via the symbol system described in *Framework Assessment of Sustainability*.
3. Provide future considerations on how the U.S. federal marine fishery management system may mitigate gaps or weaknesses in conformance (as per the reviewer's rating).

Overall:

4. Compile ratings for all 25 Topics of Pertinence into one summary sheet (as described by Table 1 template in *Framework Assessment of Sustainability*).
5. After completing the conformance assessment of the U.S. federal marine fishery management system, provide suggestions on refining the methodological processes described in *Framework Assessment of Sustainability.*